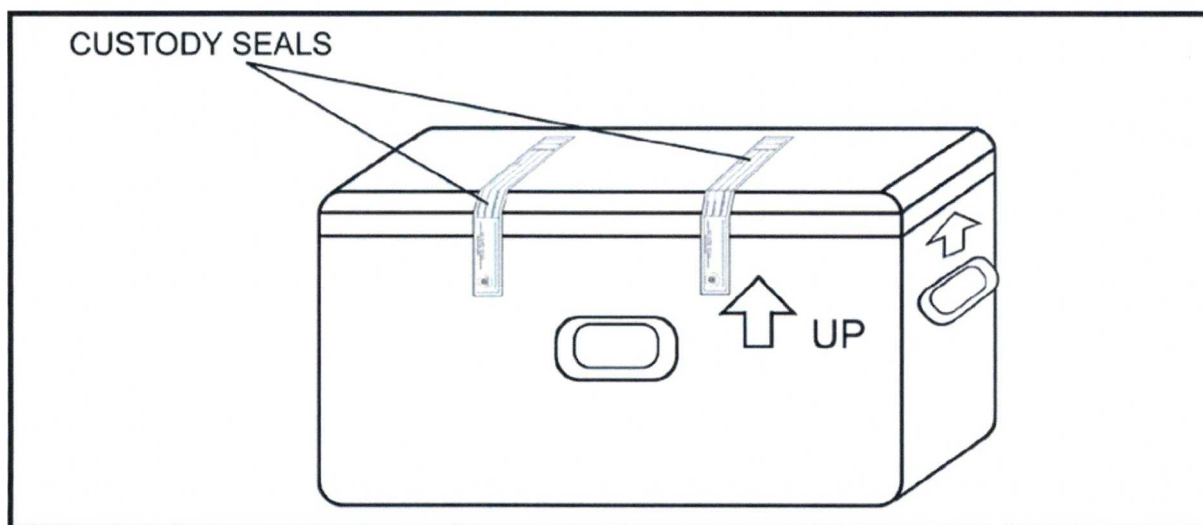


**FIGURE 4**  
**EXAMPLE OF A CUSTODY SEAL**

|   |
|---|
| <p><b>CUSTODY SEAL</b></p> <p>Date _____</p> <p>Signature _____</p> |
|---|

**FIGURE 5**

**EXAMPLE OF SHIPPING COOLER WITH CUSTODY SEALS**



Source: U.S. Environmental Protection Agency. 2011.

Please note that the two seals typically are affixed *to opposite sides of the cooler and offset from each other*, although the offset is not depicted on the EPA figure above.

**SOP APPROVAL FORM**

TETRA TECH, INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

**RECORDING NOTES IN FIELD LOGBOOKS**

**SOP NO. 024**

**REVISION NO. 2**

Last Reviewed: November 2014

*Carla J. Bunk*

\_\_\_\_\_  
Quality Assurance Approved

\_\_\_\_\_  
November 24, 2014  
Date

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 1 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

## 1.0 BACKGROUND

Complete and accurate field documentation is critical to a successful project and the field log book is an important tool to support field documentation needs. The field logbook should include detailed records of all field activities, document interviews with people, and record observations of conditions at a site. Entries should be described in a level of detail to allow personnel to reconstruct, after the fact, activities and events that occurred during their field assignments. Furthermore, entries should be limited to facts. Avoid speculation related to field events and do not record hearsay or unfounded information that may be presented by other parties during field activities. For example, do not record theories regarding the presence or absence of contamination when you are collecting field screening data or speculation regarding the reasons for a property owner's refusal to grant access for sampling.

Field logbooks are considered accountable documents in enforcement proceedings and may be subject to review. Therefore, the entries in the logbook must be accurate and detailed, but should not contain speculative information that could conflict with information presented in subsequent project deliverables and correspondence. Also be aware that the field logbooks for a site may be a primary source of information for depositions and other legal proceedings that may occur months or years after field work is complete and long after our memories have faded. The accuracy, neatness, and completeness of field logbooks are essential for recreating a meaningful account of events.

### 1.1 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide guidance to ensure that field logbook documentation collected during field activities meets all requirements for its later use. Among other things, field logbooks may be used for:

- Identifying, locating, labeling, and tracking samples
- Recording site activities and the whereabouts of field personnel throughout the day
- Documenting any deviations from the project approach, work plans, quality assurance project plans, health and safety plans, sampling plans, and any changes in project personnel
- Recording arrival and departure times for field personnel each morning and evening and weather conditions each day
- Describing photographs taken during the project.

|   |   |
|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 2 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

In addition, the data recorded in the field logbook may later assist in the interpretation of analytical results. A complete and accurate logbook also aids in maintaining quality control, because it can verify adherence to project scope and requirements.

## 1.2 SCOPE

This SOP establishes the general requirements and procedures for documenting site activities in the field logbook.

## 1.3 DEFINITIONS

None.

## 1.4 REFERENCES

Compton, R.R. 1985. *Geology in the Field*. John Wiley and Sons. New York, NY.

## 1.5 REQUIREMENTS AND RESOURCES

The following items are required for field notation:

- Field logbooks
- Ballpoint pens or Sharpies with permanent waterproof ink
- 6-inch ruler (optional)

Field logbooks should be bound (sewn) with water-resistant and acid-proof covers, and each page should have preprinted lines, numbered pages, and a single column. They should be approximately 7½ by 4½ inches or 8½ by 11 inches in size. Loose-leaf sheets are not acceptable for use as field notes.\* If notes are written on loose paper, they must be transcribed as soon as possible into a bound field logbook by the same person who recorded the notes originally. *\*Note: Data collection logs and field forms used to record field measurements and data are acceptable as loose-leaf sheets maintained in a three-ring binder with numbered pages.*

Ideally, distribution of logbooks should be controlled by a designated person in each office. This person assigns a document control number to each logbook, and records the assignment of each logbook distributed (name of person, date distributed, and project number). The purpose of this procedure is to ensure the integrity of the logbook before its use in the field, and to document each logbook assigned to a

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 3 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

project. In the event that more than one logbook is assigned to a project, this process will ensure that all logbooks are accounted for at project closeout.

## 2.0 PROCEDURES

The following subsections provide general guidelines and formatting requirements for field logbooks, and detailed procedures for completing field logbooks.

### 2.1 GENERAL GUIDELINES

- A separate field logbook must be maintained for each project. If a site consists of multiple subsites (or operable units), designate a separate field logbook for each subsite. Similarly, if multiple activities are occurring simultaneously requiring more than one task leader (well installation, private well sampling, or geophysical survey.), each task leader should maintain a separate field logbook to ensure that each activity is documented in sufficient detail.
- At larger sites, a general field log may be kept at the site trailer or designated field office to track site visitors, document daily safety meetings, and record overall site issues or occurrences.
- Data from multiple subsites may be entered into one logbook that contains only one type of information for special tasks, such as periodic well water-level measurements.
- All logbooks must be bound and contain consecutively numbered pages.
- No pages can be removed from the logbook for any purpose.
- All information must be entered using permanent, waterproof ink. Do not use pens with “wet ink,” because the ink may wash out if the paper gets wet. Pencils are not permissible for field notes because information can be erased. The entries should be written dark enough so that the logbook can be easily photocopied.
- Be sure that all entries are legible. Use print rather than cursive and keep the logbook pages free of dirt and moisture to the extent possible.
- Do not enter information in the logbook that is not related to the project. The language used in the logbook should be factual and objective. Avoid speculation that could conflict with information presented in subsequent project deliverables and correspondence (see Section 1.0 above).
- Use military time, unless otherwise specified by the client.
- Include site sketches, as appropriate.
- Begin a new page for each day’s notes.
- Include the date at the top of each page.
- At the end of a day, draw a single diagonal line through any unused lines on the page, and sign at the bottom of the page. Note and implement any client specific requirements (for example, some U.S. Environmental Protection Agency (EPA) programs require each logbook page to be signed).

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 4 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

- Write notes on every line of the logbook. Do not skip any pages or parts of pages unless a day's activity ends in the middle of a page.
- If a line is left blank for some reason, cross out (with a single line) and initial to prevent unauthorized entries.
- Cross out (with a single line) and initial any edits to the logbook entries. Edits should only be made if the initial entry is illegible or erroneous. Do not make corrections for grammar or style.

## 2.2 LOGBOOK FORMAT

The layout and organization of each field logbook should be consistent and generally follow the format guidelines presented below. Some clients or contracts may have specific formatting guidelines that differ somewhat from this SOP; review client requirements at the start of the project to help ensure any client-specific guidelines are integrated.

### 2.2.1 Logbook Cover

Write the following information on the front cover of each logbook using a Sharpie or similar type permanent ink marker:

- Logbook document control number (assigned by issuer)
- "Book # of #" (determined by the project manager if there is more than one logbook for the project)
- Contract and task order numbers
- Name of the site and site location (city and state)
- Name of subsite (or operable unit), if applicable
- Type of activity (if logbook is for specific activity, such as well installation or indoor air sampling)
- Beginning and ending dates of activities entered into the logbook

### 2.2.2 Inside Cover or First Page

Spaces are usually provided on the inside front cover (or the opening page in some logbooks) for the company name, address, contact names, and telephone numbers. If preprinted spaces for this information are not provided in the logbook, write the information on the first available page. Information to be included on the inside front cover or first page includes:

- Tetra Tech project manager and site manager and phone numbers
- Tetra Tech office address

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 5 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

- Client contact and phone number
- Site safety officer and phone number
- Emergency contact phone number (911, if applicable, or nearest hospital)
- Subcontractor contacts and phone numbers
- Site property owner or property manager contact information

### 2.3 ENTERING INFORMATION IN THE LOGBOOK

The following lists provide guidance on the type of information to be included in a typical field logbook. This guidance is general and is not intended to be all-inclusive. Certain projects or clients may specify logbook requirements that are beyond the elements presented in this SOP.

#### **General Daily Entries:**

- Document what time field personnel depart the Tetra Tech office and arrive at the hotel or site. If permitted by the client to charge travel time for site work, document what time personnel leave and arrive at the hotel each day. (This information may be needed at remote sites where hotel accommodations are not near the site.)
- Indicate when all subcontractors arrive and depart the site.
- Note weather conditions.
- Include the date at the top of each page.
- Document that a site safety meeting was held and include the basic contents of the meeting.
- List the level of protection to be used for health and safety.
- Summarize the day's planned activities.
- Summarize which activities each field team member will be doing.

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 6 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

### **Field Activity Entries:**

- Refer to field data collection forms for details about field data collection activities (for example time, date, depth of samples, field measurements). If separate field sampling sheets are not used, see section below regarding logbook entries for sampling activities.
- Refer to well purge forms, well construction logs, and other activity-specific forms as applicable rather than including this type of information in the field logbook. These other forms allow the information to be more accessible at a later date.
- List any air monitoring instrumentation used, with readings and locations.
- Refer to instrument field logs for equipment calibration information.
- Summarize pertinent conversations with site visitors (agency representatives, property owners, client contacts, and local citizens).
- Summarize any problems or deviations from the quality assurance project plan (QAPP) or field sampling plan.
- Document the activities and whereabouts of each team member. (As indicated in Section 2.1, multiple logbooks may be required to ensure sufficient detail for contemporaneous activities).
- Indicate when utility clearances are completed, including which companies participated.
- Indicate when verbal access to a property is obtained.
- Include names, addresses, and phone numbers of any pertinent site contacts, property owners, and any other relevant personnel.
- Document when lunch breaks or other work stoppages occur.
- Include approximate scale for all diagrams. If a scale is not available, write “not to scale” on the diagram. Indicate the north direction on all maps and cross-sections, and label features on each diagram.

**Sampling Activity Entries:** The following information should typically be on a sample collection log and referenced in the log book. If the project does not use sample sheets as a result of project-specific requirements, this information should be included in the logbook.

- Location description
- Names of samplers
- Collection time
- Designation of sample as a grab or composite sample
- Type of sample (water, sediment, soil gas, or other medium)
- On-site measurement data (pH, temperature, and specific conductivity)

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 7 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

- Field observations (odors, colors, weather)
- Preliminary sample description
- Type of preservative used.
- Instrument readings, if applicable

#### **Closing Daily Entries:**

- Describe decontamination procedures (personnel and equipment).
- Describe handling and disposition of any investigation-derived wastes.
- Summarize which planned activities were completed and which ones were not.
- Note the times that personnel depart site for the day.
- Summarize any activities conducted after departing the site (paperwork, sample packaging, etc.). This may be required to document billable time incurred after field activities were completed for the day.

#### **Photographic Log Entries:**

- For digital photographs, indicate in the text that photographs were taken and the location where the photographs can be found (for example, in the project file).
- Camera and serial #
- Photographer
- Date and time of photograph
- Sequential number of the photograph and the film roll number or disposable camera used (if applicable)
- Direction of photograph
- Description of photograph

## **2.4 LOGBOOK STORAGE**

Custody of logbooks must be maintained at all times. During field activities, field personnel must keep the logbooks in a secure place (locked car, trailer, or field office) when the logbook is not in personal possession. When the field work is over, the logbook should be included in the project file, which should be in a secured file cabinet. The logbook may be referenced in preparing subsequent reports and may also be scanned for inclusion as an appendix to a report. However, it is advisable to obtain direction directly from the client before including the logbook as a report appendix, because its inclusion may not be appropriate in all cases.

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|---|---|
| Tetra Tech, Inc. EMI Operating Unit – Environmental SOP No. 024 | Page 8 of 8   |
| Title: <b>Recording Notes in Field Logbooks</b>                 | Revision No. 2, November 2014<br>Last Reviewed: November 2014 |

## 2.5 HEALTH AND SAFETY CONSIDERATIONS

In addition to the procedures outlined in this SOP, all field staff must be aware of and follow the health and safety practices that result from the Activity Hazard Analyses (AHAs) for a project. The AHAs include critical safety procedures, required controls, and minimum personal protective equipment (PPE) necessary to address potential hazards. The hazards specific to project tasks must be identified and controlled to the extent practicable and communicated to all project personnel via the approved, project-specific Health and Safety Plan (HASP).

**SOP APPROVAL FORM**



**START CONTRACT-SPECIFIC  
ENVIRONMENTAL STANDARD OPERATING PROCEDURE**

**Indoor Dust Sampling Using a HEPA Vacuum**

**SOP NO. 071**

**REVISION NO. 0**

Last Reviewed: Not applicable (Revision No. 0)

  
\_\_\_\_\_  
Quality Assurance Approved

2/21/2017  
\_\_\_\_\_  
Date

## 1.0 BACKGROUND

Indoor dust is typically sampled using a high-efficiency particulate air (HEPA) vacuum to assess human health exposure to particulate matter found on surfaces such as floors and window sills within a building. Dust collected using this method can be fractionated to particle sizes less than or greater than 150 micrometers ( $\mu\text{m}$ ) in diameter to determine the chemical concentrations and evaluate ingestion impacts to children or other sensitive receptors. Data collected can also be used to estimate dust loading on surfaces and can be input into an Integrated Exposure Uptake Biokinetic Model (IEUBK) to evaluate risk during a human health risk assessment.

### 1.1 PURPOSE

The purpose of this standard operating procedure (SOP) is to describe sampling procedures for collecting indoor dust samples using a HEPA vacuum. Sampling is performed to evaluate human health exposure risks.

### 1.2 SCOPE

This SOP describes procedures for conducting indoor dust sampling using the Atrix International, Inc., Omega Vac with internal HEPA filter. Samples collected using this methodology can be analyzed for total dust and metals and can be processed using a No. 100 sieve to differentiate between fine dust (less than 150  $\mu\text{m}$  in diameter) and coarse dust (larger than 150  $\mu\text{m}$  in diameter).

### 1.3 DEFINITIONS

**Coarse Fraction:** Portion of dust with particle sizes greater than 150  $\mu\text{m}$  in diameter.

**Dust Loading:** The amount of dust per unit area, expressed in micrograms per square foot ( $\mu\text{g}/\text{ft}^2$ ) or micrograms per square meter ( $\mu\text{g}/\text{m}^2$ ).

**Filter Holder:** An apparatus that supports and contains the filter medium used to collect dust. It is also often referred to as a sampling cassette.

**Fine Fraction:** Portion of dust with particle sizes less than 150  $\mu\text{m}$  in diameter. This size is typically considered the portion of dust most likely to be inhaled or ingested based on its ability to be suspended in air or to adhere to the hands and skin.

**Contaminant Concentration:** The mass concentration of a contaminant per mass of dust, typically reported as micrograms per gram ( $\mu\text{g/g}$ ) or parts per million (ppm).

**Contaminant Loading:** The amount of a contaminant per unit area, expressed in  $\mu\text{g/ft}^2$  or  $\mu\text{g/m}^2$ .

## 1.4 REFERENCES

- ASTM International. 2011. ASTM Standard D7144-05a, 2011, “Standard Practice for Collection of Surface Dust by Micro-vacuum Sampling for Subsequent Metals Determination.” ASTM International, West Conshohocken, PA. DOI: 22.04/D7144-05a.
- U.S. Environmental Protection Agency (EPA). 2008. “Guidance for the Sampling and Analysis of Lead in Indoor Residential Dust for Use in the Integrated Exposure Uptake Biokinetic (IEUBK) Model.” Prepared by the Lead Committee of the Technical Review Workgroup for Metals and Asbestos, Office of Superfund Remediation and Technology Innovation EPA. OSWER 9285.7-81. December.
- EPA. 2016. Memorandum concerning Recommendations for Sieving Soil and Dust Samples at Lead Sites for Assessment of Incidental Ingestion. From Dana Stalcup, Director, Assessment and Remediation Division. To: Superfund National Program Managers. Regions 1 through 10. OLEM Directive 9200.1-128. July 1.

## 1.5 REQUIREMENTS AND RESOURCES

Dust sampling using a HEPA vacuum requires the use of one or more of the following types of equipment:

- HEPA Vacuum/Omega Vac Supreme: Atrix International Inc. (Atrix)
- Trace Evidence Collection Filter with Upholstery Tool: FFUT (Atrix) or 619E2 (Sirchie)
- Trace Evidence Collection Filter with Crevice Tool: FFCT (Atrix) or 619E1 (Sirchie)
- 4-inch HEPA (0.3 micron) Filter: DISC-4H (Atrix)
- Scale with a minimum 1-gram sensitivity

In addition, the following equipment is also needed for collecting vacuum dust samples:

- Nitrile gloves
- Extension cord
- Duct tape
- Logbook and pen
- Health and safety equipment
- Tablet computer (optional for digital data capture)

## **2.0 VACUUM DUST SAMPLING ASSEMBLY**

The vacuum dust sampling chain assembly consists of four primary components: (1) the HEPA vacuum; (2) the vacuum hose; (3) the filter holder, including HEPA filter; and (4) the upholstery or crevice collection tool. See Figure 1 at the end of this document for an example of the assembled sampling chain. It is common for the HEPA filter and filter holder to be provided unassembled. In this case, the HEPA filter must be installed in the filter holder in laboratory-like conditions. Typically, at least one of the filter endcaps is labeled with a sticker as either “Tool Mount” or “Vacuum Hose Mount.” The filter endcap that is compatible with the vacuum hose attachment should be removed, and the HEPA filter should be placed on top of that end cap. The endcap should then be reinstalled in the clear central portion of the filter holder, locking the HEPA filter in place. Two pieces of duct tape should then be used to secure the filter holder endcaps in place. The duct tape should be affixed so that it is in contact with both filter holder endcaps and the clear central portion of the filter holder. See Figure 2 at the end of this document for an example of an assembled filter holder. The upholstery and crevice tools can be used interchangeably based on sample location. The upholstery tool is typically used to collect samples from relatively large sample areas, such as floors, because of its greater width. The crevice tool is typically used to collect samples from narrow sample areas, such as window sills, as a result of its smaller profile. The sampling chain is generally assembled in the order listed above. During sampling, the vacuum pressure generated by the HEPA vacuum is transferred to the sampling apparatus via the vacuum hose. The vacuum pressure is used to collect dust particles from the sampling surface via the upholstery or crevice collection tool. The dust particles travel from the upholstery or crevice tool into the filter holder, where they encounter the 4-inch HEPA (0.3 micron) filter. Dust particles are then trapped in the filter and the filter holder. When sampling is completed, the entire filter holder is submitted for laboratory analysis.

## **3.0 VACUUM DUST SAMPLING METHODOLOGY**

A single filter/filter holder is used for all sampling and laboratory analytical procedures. The total amount of dust is determined gravimetrically, so it is important to accurately measure the weight of the filter holder before and after sampling. The dust contained in the filter holder is then passed through a No. 100 sieve to isolate particles with diameters less than 150  $\mu\text{m}$  from those with larger diameters. The particles that pass through this sieve are considered the fine dust fraction of the total sample. Particles that are not able to pass through the sieve are considered the coarse dust fraction of the total sample. Each fraction of the sample can then be analyzed separately for metals content. This analysis provides the total weight of dust in the sample, the weight of the fine and coarse fractions of the sample, and the concentrations of selected metal analytes in each dust fraction. The laboratory can then calculate the total

concentration of the selected metal analytes. The concentrations of selected analytes can be reported directly and can also be used in concert with the fraction weight and area sampled to calculate analyte- and fraction-specific dust loading. The dust loading can be calculated using the total dust weight with the area sampled.

Vacuum dust samples by nature are composite samples of the area vacuumed. Analytical results are reported on a gravimetric basis, as are relevant screening standards. As a result, it is important to collect accurate data for the areal extent of each sample. It is also important to record the weight of the filter holder before and after sampling.

### **3.1 SAMPLING PROCEDURE**

The following sections discuss (1) preparing equipment and collecting necessary data prior to sampling, (2) collecting the sample, and (3) collecting post-sampling data.

#### **3.1.1 Sampling Preparation**

It is necessary to collect pre-sampling data before sample collection can be initiated. This process includes identifying sample locations, preparing equipment for sampling, and recording important data used to characterize the sample. Sampling preparation steps are discussed in further detail below.

##### **3.1.1.1 Select Sample Locations**

Selecting sample locations should follow a site-specific methodology. A common methodology consists of selecting sample locations to quantify (1) the worst-case exposure scenario, and (2) the exposure to the most sensitive receptor in the residence. One sample is typically collected from within the most frequently used entrance to the dwelling to quantify the worst-case exposure scenario. The most frequently used entrance is the area that is most heavily exposed to dirt and dust carried into the house from the exterior. This entrance area must be located within permanent living space in the residence. For the purposes of sample location selection, 3-season rooms and screened porches are not considered part of the permanent living space, as they are not utilized year-round. Samples should not be collected from 3-season rooms or screened porches. A second sample is typically collected from the bedroom of the youngest child that lives at the residence. If no child lives at the residence, the second sample is typically collected from the room where the residents spend the most time. If requested by the resident, it is also possible to collect a sample from the basement level of the dwelling to evaluate the potential for flood water to transport contaminants into the dwelling. If a basement sample is collected, it should be collected near a sump pump, if one exists, to evaluate the most likely depositional area for suspended

sediment and dust transported by water. If no sump is present, the sample should be collected from near existing floor drains. If no floor drains are present, the sample should be collected from any areas that appear likely to collect standing water (such as low points and depressions).

Composite or additional samples can be collected when multiple entrances are used equally, or when young children sleep in multiple bedrooms. Composite samples are typically used to measure the average exposure over the areas sampled. Additional samples can be substituted for composite samples to measure exposure in specific locations, based on resident preference.

The specific area to be sampled should be selected after the general area (entrance/room) where sampling will occur has been selected. The specific area should be selected to best characterize the intended exposure scenario. The area for worst-case exposure scenario samples collected at a dwelling entrance should encompass the space that is most likely to be walked immediately after residents enter, including door mats or rugs. The sampling area for the most sensitive receptor exposure scenario should encompass the space most commonly used within the general location. In bedrooms, this space typically includes the area near the entrance to the room and the area near the bed. In living rooms, it typically includes the most frequented walking route through the room and areas near commonly used couches and chairs. When possible, sampling areas should be made up of a contiguous area with reasonably simple geometry to avoid errors in calculating the total area sampled.

#### **3.1.1.2 Record Pre-Sampling Data**

It is necessary to collect detailed data before the sample is collected to (1) ensure that sampling conditions are fully documented, and (2) provide the necessary information for determining the sample weight and area sampled. Required pre-sampling data can be divided into two categories: property-specific data, and sample-specific data.

Property-specific data should include at least the following information:

- Property Address or Property identification (ID)/Code (should be assigned on a site-specific basis to protect the identity and personal details of residents)
- Names of Samplers
- Sampling Scenario: Preliminary, Pre-remediation, Post-remediation, or other
- Date of Sampling.

Sample-specific data should include at least the following information:

- Time of Sample Collection

- Sample ID: Use site-specific sample ID nomenclature, ensuring the nomenclature includes at least Property ID, Sample Sub-Location, and Sample Date, at a minimum
- Sample Sub-Location: Room name, entrance
- Floor Type: Wood, carpet, tile, or other
- Vacuum ID
- Pre-Sample Filter Holder Weight.

Digital data capture technology is recommended based on the number of samples and properties typically included in dust sampling projects. A tablet computer equipped with field data recording software (such as iForms or Collector App) and a custom, site-specific data capture form facilitates uniform collecting, storing, and processing of sampling data.

It is necessary to complete a sketch of the floorplan of the residence in a field logbook to document the location of the sample. The sketch should include the layout of rooms on the floor of the residence where the sample is being collected and major features in each room (furniture, doorways). The sketch should include a North arrow to indicate relative direction and a note indicating that the sketch is not to scale. The sample area should be clearly demarcated with dimensions, and total area sampled should be noted on the sketch. It is crucial for the sketch to clearly and accurately define the location of the sampling area within the residence. This sketch will be used to ensure that the post-cleaning sample is collected from the exact area sampled before the residence was cleaned to allow for valid comparison of results.

After the specific sample location has been selected and the sampling apparatus is assembled, the dust sample can be collected. The exact area to be sampled should be selected and measured to ensure accurate accounting of the sampling area. A measuring tape can be used as a guide for sampling area, or a count of tiles can be used if sampling is being conducted on a tile floor, provided the size of an individual tile is known. Once the sampler has a clear understanding of the specific area to be sampled, sample collection may commence, and the start time of sample collection should be recorded.

#### **3.1.1.3 Prepare Sampling Equipment**

After the specific area to be sampled has been selected, sampling equipment should be prepared, including collection of relevant pre-sampling data (see Section 3.1.1.2). The following steps should be taken before a sample is collected:

1. Remove the filter holder from the evidence bag and label it with Sample ID using site-specific nomenclature, as described in Section 3.1.1.2. Take care to place the filter holder on a clean surface to prevent cross contamination caused by contacting contaminated surfaces before sampling.

2. Record pre-sampling weight of filter holder. Use a scale with minimum 1-gram sensitivity to measure the weight of the filter holder before sampling. Make sure the entire filter holder apparatus is weighed (including caps). Make sure scale is tared to zero before the filter holder is weighed.
3. Assemble sampling apparatus as described below
  - 3.1 Plug the power cord into the power port in the rear of the HEPA vacuum and into the functioning electrical outlet closest to the sample location, using an extension cord as needed. The power cord and vacuum hose can typically be found in the internal compartment in the lid of the HEPA vacuum.
  - 3.2 Insert the vacuum hose into the prefabricated slot for the hose on the front of the HEPA vacuum.
  - 3.3 Connect the filter holder to the vacuum hose. The filter holder should be oriented so that the end with the HEPA filter is located closest to the vacuum hose. If the filter holder has been assembled correctly, it will fit directly on the vacuum hose. If the filter holder does not fit directly on the vacuum hose, it can be secured to the vacuum hose using duct tape, or a different filter holder can be used.
  - 3.4 Attach the upholstery or crevice collection tool directly to the open end of the filter holder, completing the sampling chain. If the security of the connection between the upholstery or crevice collection tool and the filter holder is in question, the tool can be secured with duct tape.

Figures depicting the overall sampling assembly and a detail view of the filter holder and upholstery or crevice tool assembly are provided at the end of this document

### **3.1.2 Sample Collection**

To begin sampling, the upholstery or crevice tool should be positioned so that it is touching the nearest boundary of the specific sampling area. The HEPA vacuum should then be powered on. The upholstery or crevice tool should be moved over the surface of the specific sampling area at a rate of approximately 0.5 foot per second, maintaining contact with the floor surface. The upholstery or crevice tool should be moved in a vertical pattern, taking care to ensure that the entirety of the specific sampling area is vacuumed. The entirety of the sampling area should be vacuumed once using passes in a vertical direction. The same area should not be vacuumed repetitively, or using passes in multiple directions. Care should be taken to avoid relatively large debris (such as coins, paper clips, or large food particles). If the sampling area is composed of both a hard surface and a carpeted surface, the entirety of the hard surface should be vacuumed before the carpeted surface to prevent clogging of the sample filter.

After the entire sampling area has been vacuumed, the sampling apparatus should be held in a vertical position with the upholstery or crevice tool facing up. The sampler should loosely place a hand over the tool to prevent any dust from escaping and power off the HEPA vacuum, recording the ending time of sample collection. The sampling apparatus should be disassembled using the following steps:

1. Disconnect the upholstery or crevice tool from the filter holder, ensuring the filter holder remains in a vertical position to avoid the loss of any sample material.
2. Immediately attach the filter holder cap onto the newly exposed open end of the filter holder. Ensure secure attachment.
3. Disconnect the filter holder from the HEPA vacuum hose. The opening does not need to be kept vertical, as the filter prevents dust from passing through the opening.
4. Attach the remaining filter holder cap onto the exposed opening, ensuring a secure attachment.

### **3.1.3 Collecting Post-Sampling Data**

When sample collection has been completed, the filter holder must be weighed. If the pre-sample weight and post-sample weight of the filter holder are the same, the sample area must be expanded until at least 1 gram of dust is collected, following the steps described in Section 3.1.2.

Once the sampling is completed with a sufficient mass of dust collected, labels should be affixed on both the filter holder and the evidence bag indicating sample ID, time of sample collection, the weight of the unit before sampling, and the weight after sampling. Once each label is attached, the filter holder should be placed into the evidence bag and sealed. No special preservation (temperature control or other) is required for shipping. Samples should be placed into a box with ample packing material to ensure that the filter holders stay in place during shipping. Any forceful contact with other samples or the sides of the box during shipping could dislodge dust from the filters and affect the laboratory results.

## **3.2 POST-CLEANING SAMPLING PROCEDURE**

The following post-cleaning sampling procedures outline a similar process as that described in Section 3.1. These procedures, however, should be used in residences that have already been sampled and cleaned and are being sampled again to evaluate the efficacy of cleaning. To accurately evaluate cleaning efficacy, it is essential that the same sample locations and areas be sampled during both pre- and post-cleaning sampling. The post-cleaning sampling procedure is similar to the general sampling procedure, with a focus on ensuring the samples are collected from the same exact locations as pre-cleaning samples. Further details are provided below.

### **3.2.1 Sampling Preparation**

The sampling preparation process for post-cleaning samples is similar to the process described in Section 3.1.2, except for the section on identifying the sample location. Additionally, the sampler will need to obtain the log book from the original sampling event to determine the correct sampling locations. Sampling preparation steps are discussed in further detail below.

#### **3.1.1.1 Sample Location Selection**

During post-cleaning sampling, sample location will be established by the location of previously collected pre-cleaning samples. The areas that were sampled before cleaning must be the exact same as the areas sampled after cleaning to ensure a fair comparison of results. The logbook from the previous sampling event should be used as a reference. The sketch of the floorplan and specific sampling areas included in the logbook should be used to select the location of post-cleaning samples.

#### **3.2.1.3 Record Pre-Sampling Data**

See Section 3.1.1.3 and record the same pre-sampling data, except for the sketch of the floor plan. During post-cleaning sampling, a note should be recorded in the logbook referencing the sketch done during the previous sampling event, indicating that the same area is being sampled during the current sampling event. This note should include the number of the logbook that contains the pre-cleaning sampling floor plan. No new sketches are required during post-cleaning sampling.

#### **3.2.1.2 Prepare Sampling Equipment**

See Section 3.1.1.2 and follow the same procedures.

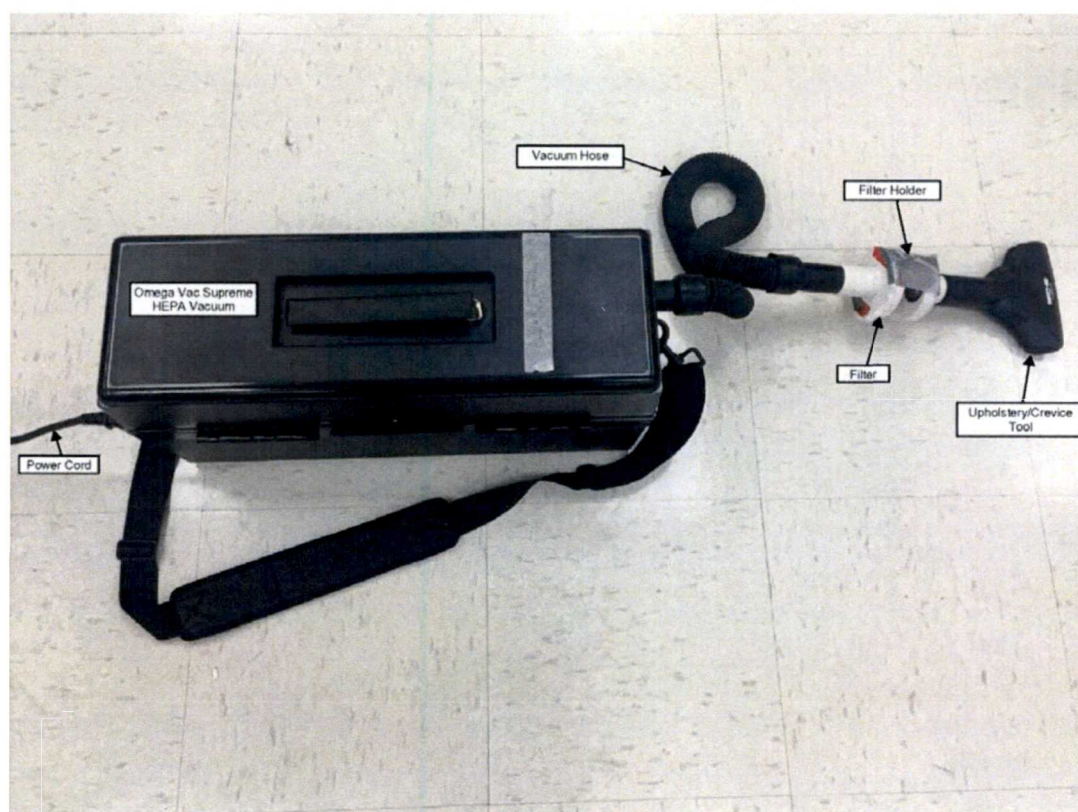
#### **3.2.2 Sample Collection**

See Section 3.1.2 and follow the same procedures, making sure to sample the same area that was sampled during pre-cleaning sampling.

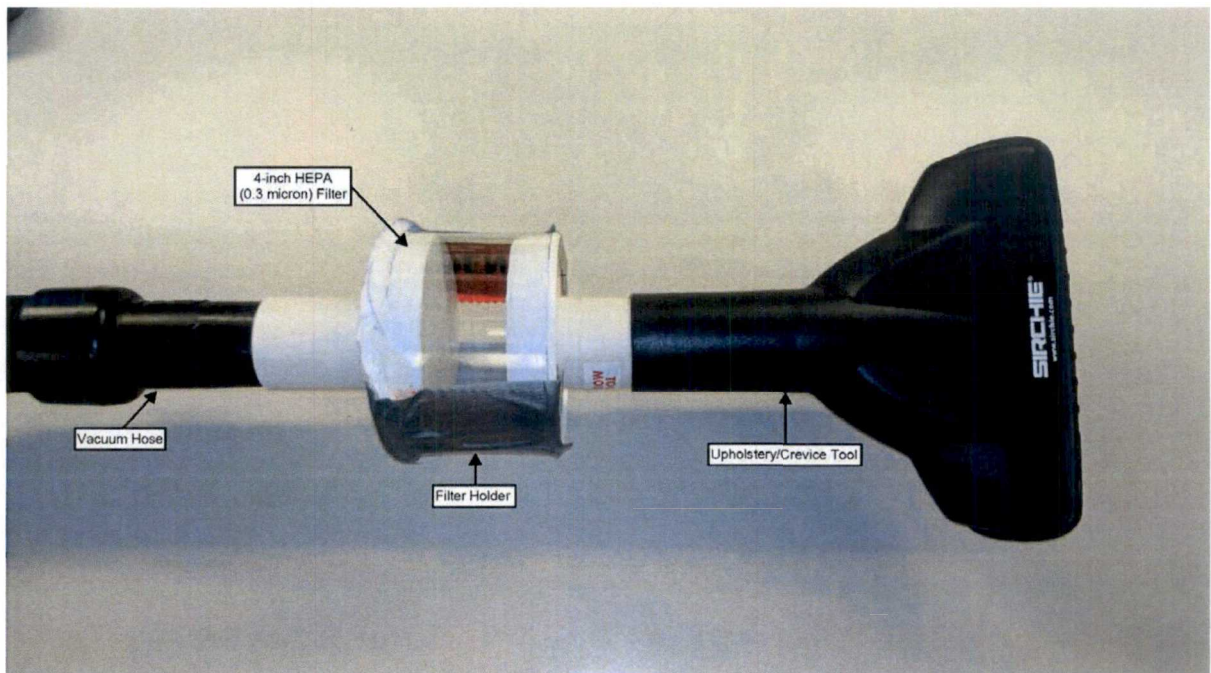
#### **3.2.3 Collecting Post-Sampling Data**

See Section 3.1.3. Use the same procedures to record post-sampling data and label and pack the sample. In this instance, however, the weight of the filter holder post-sampling may be the same as the weight pre-sampling weight because the residence was recently cleaned. Do not expand the sample area to obtain 1 gram of dust. It is crucial that the post-cleaning sample area remain the same as it was during the pre-cleaning sample.

**FIGURE 1**  
**INDOOR DUST HEPA VACUUM SAMPLING ASSEMBLY**



**FIGURE 2**  
**DETAIL VIEW OF FILTER HOLDER ASSEMBLY**



**SOP APPROVAL FORM**

TETRA TECH EM INC.

LABORATORY ANALYTICAL DATA STANDARD OPERATING PROCEDURE

**Laboratory Analytical Data Verification – Minimum Requirements**

**SOP NO. 203**

**REVISION NO. 00**

Last Reviewed: August 2010



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Quality Assurance Approved

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August 24, 2010

Date

## 1.0 BACKGROUND

Data quality assurance (QA) is necessary for every project. It is the total integrated process for assuring reliability and defensibility of decisions based on data—including analytical data. In particular, appropriate level and accurate review of data resulting from chemical and physical analysis are essential to ensure these data are of sufficient quality to support the project's technical requirements.

### 1.1 PURPOSE

The purpose of this standard operating procedure (SOP) is to ensure laboratory data used by Tetra Tech to make project decisions are of the quality required and provide the level of confidence needed to make the appropriate project decisions. This SOP specifies data verification guidelines for ensuring achievement of a minimum level of project data QA.

### 1.2 SCOPE

Analytical data generated for Tetra Tech projects must receive the appropriate level of data review. The level of detail and stringency of data verification or data validation depends on the needs of the project and program. This SOP specifies guidance for data verification procedures when program-specific or regulatory requirements are not defined contractually or by program procedures and regulations (for example, Phase II Environmental Site Assessments, emissions monitoring, and compliance reporting data for permit applications).

### 1.3 DEFINITIONS

This subsection defines key terms used in the text.

**Data package** – A hard copy or electronic report from an analytical laboratory for a set of chemical and physical analyses performed on a group of samples (sometimes referred to as a Sample Delivery Group [SDG]). The data package should contain sufficient QA documentation to complete data verification and determine data usability.

**Data usability** – A qualitative decision process whereby a qualified person determines whether the data may be used for the intended purpose. Data should be classified into one of the following two categories: usable or rejected (unusable).

**Data verification** – The act of determining and documenting whether data conform to specified requirements. The determination may involve processes such as reviewing, inspecting, testing, checking, recalculating, and auditing.

**Rejected data** – Data that do not conform to some or all requirements considered critical to assuring and confirming the quality of the data. Nonconformances may include: (1) critical quality control (QC) criteria are not met (see Table 1); (2) appropriate methods were not followed or the methods used involved significant deviations that might impact data quality or meaning; and (3) critical documentation is missing or incomplete.

**Sample delivery group** – A unit (group) of samples received by the laboratory during a field sampling event. A “sample date group” (SDG) is typically comprised of 20 or fewer samples, and is grouped based on the number of samples and not the analytical testing requested. A SDG may be defined based on the number of samples received by the laboratory on a given day or over a period of up to 7 calendar days.

**Qualified person** – A chemist or other person who received training in or has demonstrated skills and knowledge of laboratory procedures and QC. The qualified person involved in data verification should understand the data generation procedures and know project documentation and data quality requirements.

**Usable data** – Data conforming to most or all requirements considered critical to assuring and confirming the quality of the data. Conformances important to achieve usability include: (1) critical QC criteria are met (see Table 1); (2) appropriate methods were followed, or only minor deviations to the methods were made that would not impact data quality or meaning; and (3) critical documentation is complete. Professional judgment by a qualified person should be used to determine data usability.

#### 1.4 REFERENCES

- U.S. Environmental Protection Agency (EPA). 2002. Guidance on Environmental Data Verification and Data Validation EPA, QA/G-8. EPA/240/R-02/004. November. On-line address: <http://www.epa.gov/quality/qs-docs/g8-final.pdf>
- EPA. 2005. “USEPA Analytical Services Branch (ASB) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review.” September. On-line address: <http://www.epa.gov/superfund/programs/clp/download/dlm/dlm2nfg.pdf>
- EPA. 2008. “USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review.” June. On-line address: <http://www.epa.gov/superfund/programs/clp/download/somnfg.pdf>

EPA. 2009. "USEPA Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use." January. On-line address:

<http://www.epa.gov/superfund/policy/pdfs/EPA-540-R-08-005.pdf>.

EPA. 2010. "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review." January. On-line address:

<http://www.epa.gov/superfund/programs/clp/download/ism/ism1nfg.pdf>

## 1.5 REQUIREMENTS AND RESOURCES

The following are required for laboratory data verification as described in this SOP:

- Laboratory data package(s)
- Project-specific information for data use (i.e. work plan, sampling and analysis plan [SAP], quality assurance project plan [QAPP], proposal, or purchase order)
- Qualified person, familiar with laboratory procedures and capable of determining data usability.

Laboratory data package(s) should include the following to allow for data verification:

- Cover letter or case narrative, including the laboratory name and address, that certifies analytical results via signature of the project chemist, QA manager, or laboratory manager
- Signed field chain-of-custody form(s)
- Sample receipt and log-in forms, which include general comments and specify temperature, holding time, bottle breakages, and any nonconformances or discrepancies
- Laboratory log-in summary, including laboratory sample identification (ID), field sample ID, list of analyses performed, and analytical methods employed
- Analytical results
- Applicable analytical batch QC results (for example, method and field blanks, surrogate spikes, matrix spike/matrix spike duplicates [MS/MSD], and laboratory control sample/laboratory control sample duplicates [LCS/LCSD])
- List of laboratory data qualifier definitions.

Time required for laboratory data verification can vary greatly depending on the number of analyses per data package and the number of samples per data package. The following rules of thumb, including producing a record of the type found in Attachment A, may be useful for planning purposes:

- 30 minutes for a SDG with one major analysis (e.g., metals or volatiles)
- 90 minutes to 2 hours for a SDG with a common suite of analyses (e.g., metals, volatiles, semivolatiles, pesticides, polychlorinated biphenyls, and total petroleum hydrocarbons)
- 30 minutes for a SDG with a common suite of wet chemistry analyses (e.g., alkalinity, pH, major anions, total organic carbon, total dissolved solids, and total suspended solids).

The times noted are estimates only. Involving a qualified person in the planning process will help ensure proper budget for data verification.

## 2.0 PROCEDURES

**Step 1** – The project manager identifies a qualified person with an understanding of laboratory data generation and usability to review and verify the data. If the data are released to the client prior to verification, the client should be advised that the data are preliminary pending this review.

**Step 2** – The qualified person identifies the project analytical QA/QC needs for documentation and technical specifications as these apply to data content and quality. A work plan, SAP, QAPP, regulatory guidance, laboratory analytical method, client contract, or project scope of work may identify the technical specifications and QA/QC requirements.

**Step 3** – The qualified person reviews the data and documents the review findings based on the requirements for data quality needed to achieve project objectives. Serious issues regarding data usability are immediately brought to the project manager's attention for further discussion and resolution. Table 1 describes the elements of data verification.

In all cases, the laboratory chain-of-custody indicating sample IDs, matrices, and analytical methods—and perhaps frequency of collection and submittal of QA/QC samples (i.e., field duplicates, trip blanks, field blanks, equipment rinsate blanks, and MS/MSDs)—should be cross-checked with the SAP or the contracted scope of work.

In each case, professional judgment should be used to determine data usability. Ultimately, the project manager's responsibility is to ensure a qualified person has reviewed the laboratory data package, and has deemed the data usable for the data's intended purpose.

**Step 4** – The qualified person reviews and compares the analytical method detection limits (MDL), reporting limits (RL), and practical quantitation limits (PQL) for compliance with project requirements. Explicit definition and clarification of MDLs, RLs, and PQLs should be established prior to field activities.

**Step 5** – The qualified person communicates findings. The deliverable from the qualified person includes at least one of the following:

- An e-mail indicating data usability
- A memo summarizing the evaluated results
- A table of data showing data points considered biased or outside acceptance criteria for various data quality indicators by a large enough factor that use of the data might affect environmental decisions.

Some written form of communication should be provided for the project file. An example of a minimum data verification deliverable is included as Attachment A.

### 3.0 DATA VERIFICATION RESULTS

As described above, potential data verification issues involving the following designations may be encountered during this process:

**Rejected data** – During verification, the qualified person may reject some or all of the data (consider the data unusable). If laboratory data are rejected due to poor quality, the project manager may ask the laboratory to re-analyze the extracts, or re-digest and/or re-extract the original sample if enough volume remains.

**Inadequate data** – The qualified person may find the data inadequate for the intended purpose, even if all QC criteria were met—for example, a case in which laboratory reporting limits are not adequate to meet the comparison or screening values established during the project planning process.

**Incomplete data packages** – The data package provided by the laboratory may not be complete. If the laboratory data package does not include the minimum contents defined in Section 1.5, the laboratory should be notified and required to issue a revised data package.

**Title: Laboratory Analytical Data Verification – Minimum Requirements**Revision No. 00, August 2010  
Last Reviewed: August, 2010

If encountered, any of the above data designations should be addressed immediately and corrected to minimize effects on future project deliverables. Further discussion with the analytical laboratory may help in the effort to address each of the above designations. The data verifier and the project manager should discuss potential remedies or corrective measures to minimize impact(s) of the above designations on project analytical data and decisions based on those data.

Title: **Laboratory Analytical Data Verification – Minimum Requirements**

Revision No. 00, August 2010  
Last Reviewed: August, 2010

**Table 1**  
**Elements of Laboratory Data Verification**

| <b>Data Report Element</b>   | <b>Minimum Required Review</b>   | <b>Actions</b>  |
|--|--|---|
| Chain-of-custody   | Review laboratory log-in forms against chain-of-custody forms and the contracted scope of work (SAP) for: accuracy and completeness of documentation, sample quantity and IDs, proper signatures attesting to chain-of-custody, sample condition upon receipt (breakage, temperature, etc.), sample preservation (see below), and analytical method selection. | Discrepancies regarding log-in, chain-of-custody, analytical method selection, or related issues should be immediately addressed. If discrepancies are identified, the laboratory should be contacted immediately and corrective actions implemented. Improper sample handling and preservation should be investigated to determine sample adequacy (see below).                  |
| Data package completeness  | Review data package to make sure that all requested analytical procedures have occurred and required corresponding data are reported.  | Analytical results that lack supporting data and information may be considered invalid and not usable for the purpose intended. Such conditions should be immediately addressed with the project team and laboratory.   |
| Sample preservation, storage, and holding times                                | Review sample preservation, storage, and holding times in compliance with selected analytical method and matrix.   | Analytical results of samples not properly preserved and stored, or digested/extracted or analyzed outside the appropriate holding time, may be considered invalid and not usable for the purpose intended. Such conditions should be immediately addressed with the project team.  |
| Method and field blanks  | Review blank data for positive results that may indicate possible field or laboratory contamination.   | If blank contamination is found in either the laboratory method blanks or the field QC blanks (i.e., equipment rinsate blanks, source or field blanks, or trip blanks), associated sample results should be reviewed. Detections in the associated environmental samples may be attributed to laboratory or field contamination, and qualifications of the data may be necessary. |
| Precision and accuracy* (may include surrogate spikes, MS/MSDs, and LCS/LCSDs) | Review QC data summaries for the analytical method used. Use project-required, method-required, or laboratory-provided control limits. Review laboratory-assigned data quality flags and notations, and revise if necessary.   | In general, recoveries and relative percent difference values for surrogate spikes, MS/MSDs, and LCS/LCSDs that fall outside of the specified control limits may indicate problems with the laboratory analysis.*   |

Notes:

\* The type and amount of QC information available for review will depend upon the analytical method and level of data package requested.

ID Identification

LCS/LCSD Laboratory control sample/laboratory control sample duplicate

MS/MSD Matrix spike/matrix spike duplicate

QC Quality control

SAP Sampling and analysis plan

Title: **Laboratory Analytical Data Verification – Minimum Requirements**

Revision No. 00, August 2010

Last Reviewed: August, 2010

**ATTACHMENT A  
EXAMPLE DATA VERIFICATION REPORT****Prepared by:****Date:****Site Name/Job Number:****Laboratory:****Data Package or SDG Number:****Sample Designations/Names (ID):****Matrices:****Analytical Parameters:**

| <b>Data Package Element</b>  | <b>Usable</b> | <b>Rejected</b> | <b>NA</b> | <b>Description of Affected Data<br/>(note specific samples and analytical<br/>parameters affected)</b> |
|--|---------------|-----------------|-----------|--|
| Chain of custody   | —             | —               |           |  |
| Data package completeness  | —             | —               |           |  |
| Sample preservation, storage,<br>and holding times                               |               |                 |           |  |
| Method and field blank<br>contamination  |               |                 |           |  |
| Surrogate spikes   |               |                 |           |  |
| Matrix Spikes/Matrix Spike<br>Duplicates (MS/MSD)                                |               |                 |           |  |
| Laboratory Control<br>Samples/Laboratory Control<br>Sample Duplicates (LCS/LCSD) |               |                 |           |  |
| Other  |               |                 |           |  |
| Summary  |               |                 |           |  |

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## **APPENDIX C PARSONS SOPS**

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## STANDARD OPERATING PROCEDURE NO. 01

### BORROW SOURCE SOIL SAMPLING

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#### 1.0 PURPOSE OF PROCEDURE

The method described for soil sampling is applicable for borrow source soil sampling and other stockpile soil sampling using a hand trowel or similar equipment.

#### 2.0 EQUIPMENT AND MATERIALS

- Level D Modified PPE
  - Safety glasses
  - Sampling gloves
  - Hearing protection and hard hat, as necessary
- Sampling
  - Plastic sheeting
  - Hand trowel or similar
  - Sample containers
  - Plastic trash bags
  - Indelible marking pens
  - Black permanent ink pen (Sharpie or similar)
  - Field sampling logbook
  - Sampling form

#### 3.0 PROCEEDURE

##### 3.1 Collect and Log the Soil Sample

1. *Prepare the Sample Containers:* Complete the sample labels and place on the appropriate sample containers. Labels should be waterproof or the label covered with tape to prevent water damage.
2. *Collect Sample Volume:* Select an undisturbed, accessible location on the stockpile. Using a clean hand trowel or similar, push into the soil and pull out sufficient volume of fresh sample for required analyses.
3. *Collect Soil Samples:* Record sample location, time, and date of sampling in field logbook for the remaining samples. Immediately place the samples in a cooler with ice. Do not leave the sample exposed to the sun or extreme temperatures.
4. *Decontaminate Tools:* Decontaminate the media transfer tools before using to collect another sample.
5. *Submit to Laboratory:* Follow standard chain-of-custody procedures.

##### 3.2 Quality Control Samples

Quality control samples that are collected with soil samples include duplicates, matrix spike/matrix spike duplicate (MS/MSD), trip blanks, and equipment blanks. Of these, trip blanks and equipment blanks are aqueous and do not require extra soil volume. The MS/MSD sample will be submitted to the laboratory with the original sample, and the duplicate will be submitted to the laboratory as

a separate sample. The number of sampling locations that require an MS/MSD or duplicate sample should be predetermined.

#### **4.0 KEY CHECKS AND ITEMS**

- Determine if a QC sample will be required at a sampling location. If a QC MS/MSD or duplicate soil sample will be needed, then additional sample volume will be required.
- Ensure that all tools that may come into contact with the sample, a team member, other equipment, or noncontaminated environment are properly decontaminated.
- Collect rinse water investigation-derived waste from decontamination activities, per project requirements.

## STANDARD OPERATING PROCEDURE NO. 02 SOIL SAMPLING AT ZONE 2 PROPERTIES

### 1.0 PURPOSE OF PROCEDURE

Parsons will conduct confirmation soil sampling at properties with incomplete remedial designs (where concentrations exceed RALs at depths of 24-inches and/or where refusal occurred during site characterization sampling activities). The following sampling procedure was obtained from the 2003 EPA sampling guidance.

### 2.0 SAMPLING PLAN

When sampling residential lots with a total surface area less than 5,000 square feet (a typical urban lot size), collect five-point composite samples from at least each of the following locations: the front yard, the back yard, and the side yard (if the size of the latter is substantial). Space the front, back, and side yard composites equally within the respective part of the yard and outside the drip zone, away from influences of other painted surfaces (Figures 1 and 2). Composites should consist of aliquots collected from the same depth interval.

Figure 1. Recommended Minimum Soil Sampling in Yards Less Than or Equal to 5,000 Square Feet with Small Side Yard

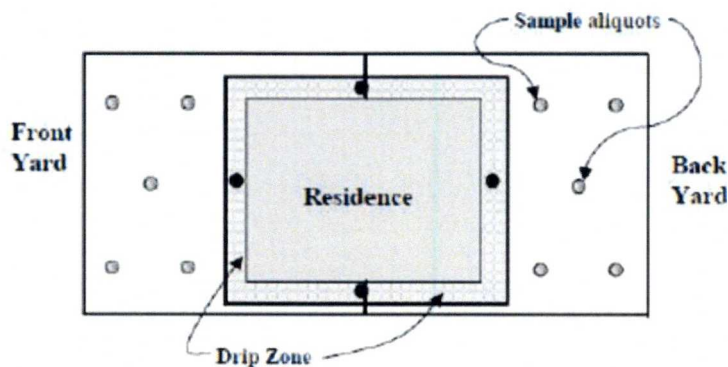
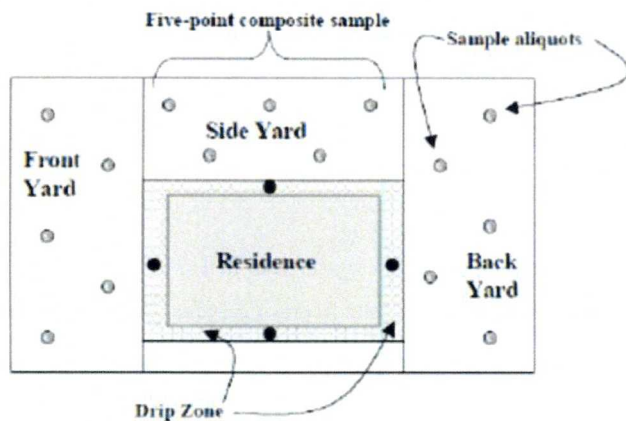


Figure 2. Recommended Minimum Soil Sampling in Yards Less Than or Equal to 5,000 Square Feet with Substantial Side Yard

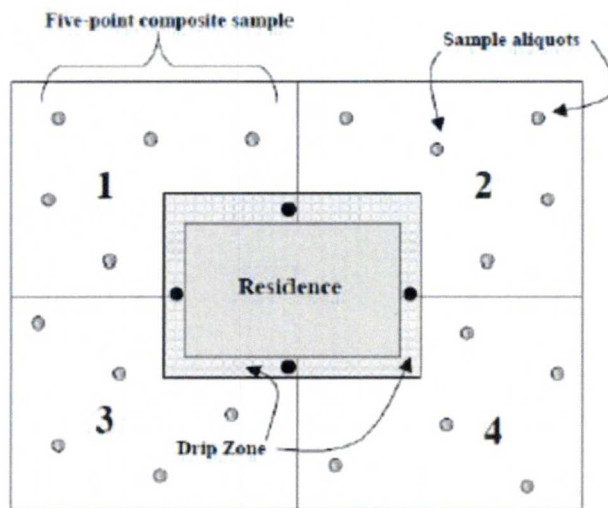


Collect five-point composite samples from the front and back yards. Collect aliquots for a single composite sample from the same depth interval. Also, collect soil samples from distinct play areas and gardens if present, and from unpaved driveways and minimal use areas, such as areas under porches and crawlspaces. Space aliquot locations equally within the area of the yard where the composite is collected. Figure 1 illustrates one possible arrangement of the sample aliquots.

Collect five-point composite samples from the front, back, and side yards, along with other areas as described in Figure 1. Space aliquot locations equally within the area of the yard from which the composite is collected. The figure illustrates one possible arrangement of the sample aliquots. Collect aliquots for a single composite sample from the same depth interval.

For residential lots with a surface area greater than 5,000 square feet, divide the property into four quadrants of roughly equal area. The two quadrants in the front yard should encompass one-half of the side yard; so should the two quadrants in the back yard. One five-point composite of aliquots collected at equal spacing and from the same depth interval should be obtained from each quadrant. Each aliquot should be collected away from influences of the drip zone and any other painted surfaces (Figure 3).

Figure 3. Recommended Minimum Soil Sampling in Yards Greater Than 5,000 Square Feet



Divide properties larger than 1 acre into 0.25-acre sections, and collect one five-point composite sample from each. For large properties, consider whether elevated concentrations trigger partial removal of soils or access restriction.

Collect five-point composite samples from each of the four quadrants as indicated above. Space the locations of the aliquots equally within each quadrant. Figure 3 illustrates one possible arrangement of the sample aliquots. The Drip Zone should not be sampled for the remedial design sampling event.

### 3.0 SAMPLE COLLECTION

Composite samples should consist of discrete aliquots of equal amounts of soil. Collect the soil from each aliquot into one clean container, such as a stainless-steel bowl, and mix thoroughly.

Once the sample is homogenized, place in the appropriate sample container. The sample can then be sent to the laboratory. Dispose of remaining sample volume in the general location from where it was collected, containerize, or archive, depending on the

requirements of the project. In some cases, material other than grass and/or soil will be encountered at a sample location. For example, wood chips and sand often are found in recreational areas of day-care and school playgrounds. Samples of the soil below the cover material should be collected.

#### **4.0 SAMPLE DEPTH**

Sampling for arsenic and lead will be conducted to define the vertical extent of contamination for cleanup purposes at select properties. When the design excavation depth has been reached for a yard area, confirmation samples will be collected for XRF screening. Composites should consist of aliquots collected from the same depth interval. XRF screening of the composite samples will be performed in accordance with SOP-02. Excavation and sampling will continue in 6-inch increments until XRF screening levels are below criteria.